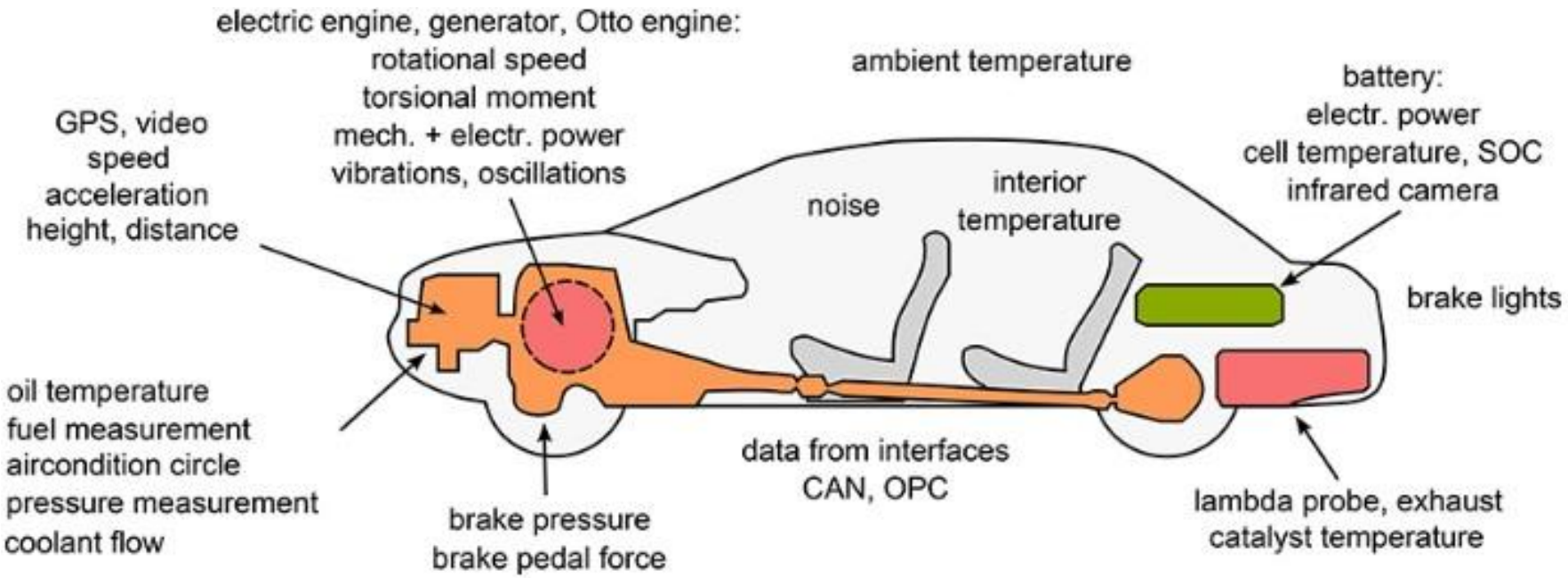
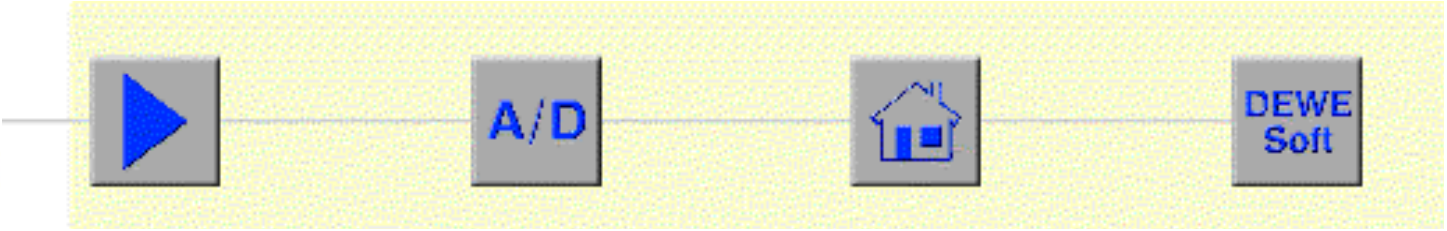
http://www.dewetron.com

HEV Measurement System

REQUIREMENT:



System block Diagram :



Sensors

Signal Conditioning

Analog to Digital Converter

Chassis

Acquisition and Analysis Software

SYSTEM HW:

DEWE-2600--Portable universal data acquisition platform

PM-CM-700--Zero flux transducer

DEWE-VGPS-HS--100 Hz GPS

RoaDyn System--One or Multi Component Wheel Force Sensors

DEWE-2600

Portable universal data acquisition platform

for analog signals

- voltage
- current
- distance
- pressure
- acceleration
- vibration
- speed
- temperature ...

for data busses

- CAN, for vehicle data or sensor data
- USB, e.g. for GPS data
- RS-232, e.g. for motion data
- Firewire, e.g. for Video data
- LAN,e.g. for Video date

MULTI-DOMAIN

for digital information

- rpm
- frequency
- period
- event counting ...
- duty cycle
- pulse width
- encoder input

DEWE-2600

* ALL IN ONE data acquisition system
* 24 bit resolution, 1MS/s per channel
* synchronous acquisition of

  Analog signals,Digital signals, Counter,CAN,Video,GPS,OBDII, ROADYN-2000
* 80 MB/s stream-to-disk rate
* 15.4" TFT display 1280 x 800 pixels
* 2.5 GHz Intel® Core™ i5 processor, 3 GB RAM,
* 1 TB HDD, DVD +-RW drive,
* 6x USB, 2x LAN Ethernet, 1x EPAD
* AC & DC & battery power supply
* yet portable by compact design
* 16 slots for DEWETRON DAQ / PAD series analog input modules

DEWE-2600

All-purpose

by different signal amplifier modules

* isolated DAQP series modules
* differential MDAQ series modules

by flexible DEWESoft software

* Recorder, Scope, FFT, Orbit, FRF ...
* Combustion Analyzer, Power Analyzer ...

by various power supply options

* 90 – 260 VAC (standard)
* optional battery power supply for independent operation
    - 3 Li-Io batteries (runtime per set appr. 2-3 hours)
    - hot-swappable (for theoretical endless runtime)
    - ext. DEWE-DCDC-24-300-ISO for 9-36 VDC supply

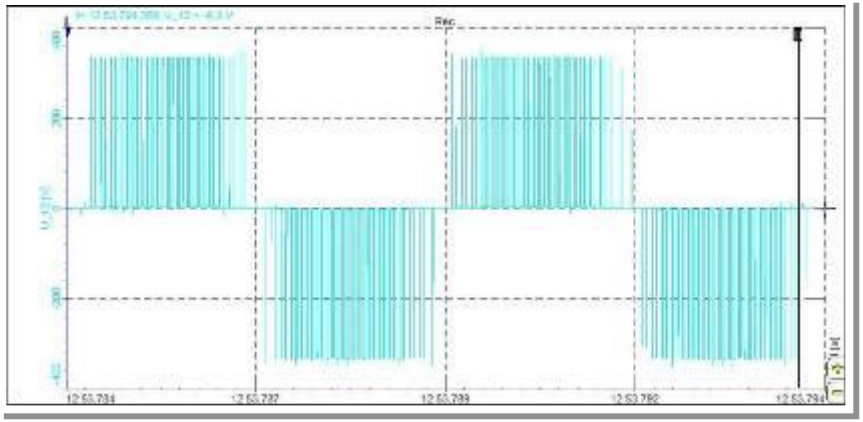
DEWE-ORION-1616-1001

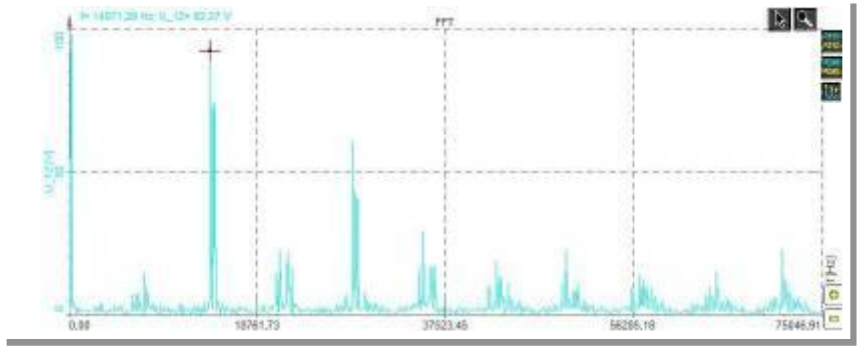
Analog to Digital Converter

- 16 channels simultaneous sampled
- 24 bit resolution
- 1000 kHz sampling rate
- *2 synchronous advanced counters or 8 additional digital TTL inputs*
- *8 synchronous digital I/Os*
- *2 optional CAN interfaces*
- *Optional 8 additional advanced counters or 40 digital inputs*

HSI modules - High Speed Isolation

Signal Conditioning Amplifier





2 MHz BW isolated signal conditioning
(High Speed Isolation)

High Speed Isolation Signal Conditioning Amplifier

HSI-HV

- Isolated voltage input amplifier
- Input ranges: 7 ranges (±20 V to ±1400 V)
- Bandwidth: 2MHz
- Filter (lowpass)：100, 300, 1k, 3k, 10k, 30k, 100k, 300 kHz, 1 MHz, 2 MHz
- High isolation 1.8 kVrms line to line and 1.4 kVrms line to ground
- High accuracy 0.05%
- Perfectly suited for measurements on variable frequency inverters (in combination with ORION-1616-1000)
- connector: 4 mm isolated banana jacks

High Speed Isolation Signal Conditioning Amplifier

HSI-LV

- Isolated voltage input amplifier
- Input ranges: 12 ranges (±10 mV to ±50 V)
- Bandwidth: 2MHz
- Filter (lowpass)：100 Hz, 300 Hz, 1 kHz, 3 kHz, 10 kHz, 30 kHz, 100 kHz, 300 kHz, 1 MHz, 2 MHz2
- Isolation:350 VDC (1 kVRMS with banana connector)
- High accuracy 0.05%
- Perfectly suited for measurements on variable frequency inverters (in combination with ORION-1616-1000)
- connector: 4 mm isolated banana jacks

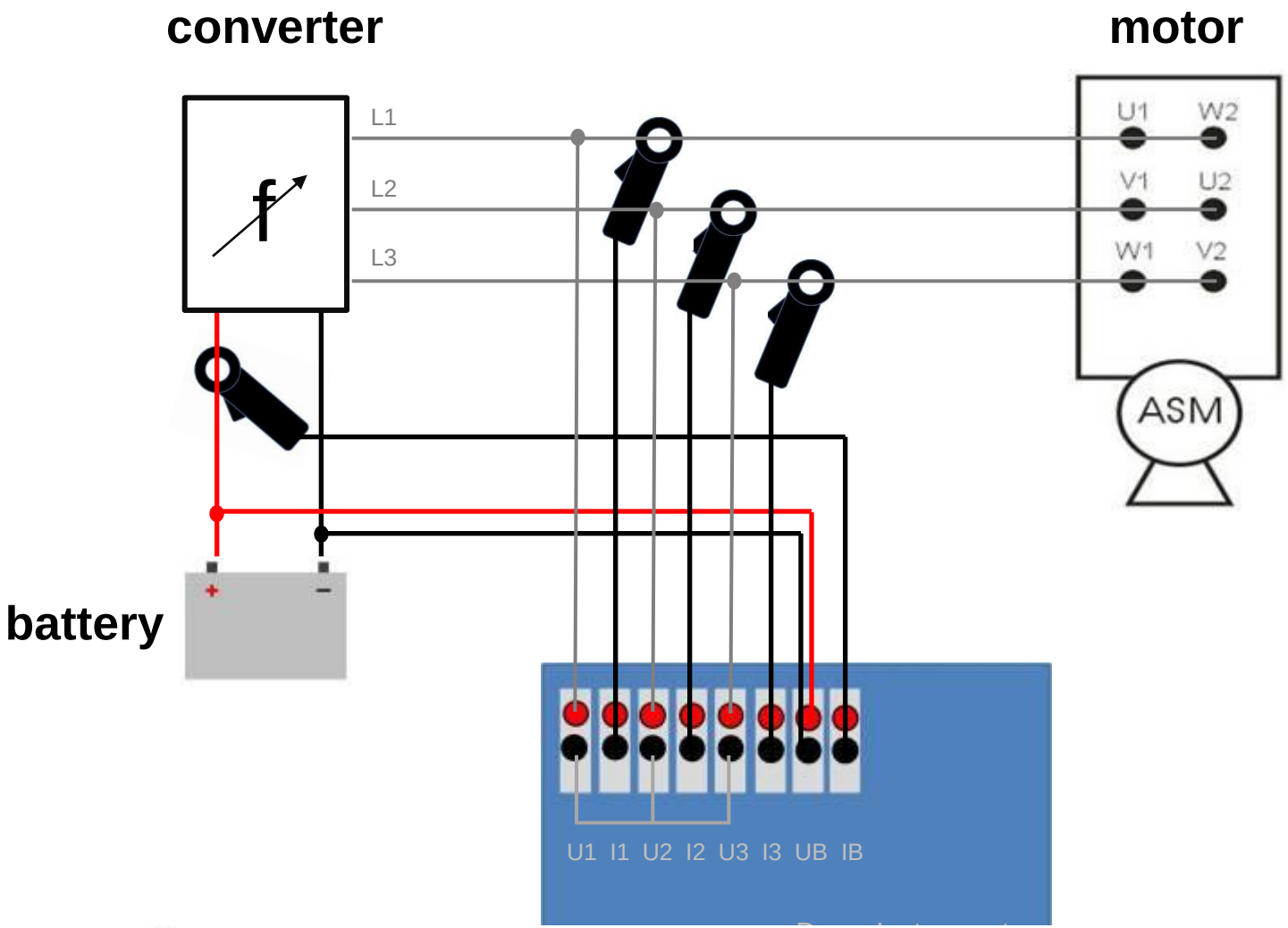
DEWE-2600 Summary

- DEWE-2600
  - Battery supply
  - Orion-1616-1001, 2 x CAN bus, 2 counters
  - DEWESoft-7-Prof + Power + CAN
  - power outlets for 8 current clamps

- E-Drive:
  - 8 x HSI-HV
  - 8 x HSI-LV
  - 5 current input by PM-MCTS-70(

- Optional:
  - VGPS-HS
  - PLUGIN-OBDII
  - PLUGIN-ROADYN-2000
  - Video
  - Etc.

Hardware setup



Current sensors

PNA-CLAMP-xx

AC, best for 50Hz only.

PNA-FLEX-300-45

AC, best for few kHz only.

Current sensors

PNA-CLAMP-1000-DC

Zero flux transducer

Accuracy:0.3 %

Bandwidth:30 Hz~5 kHz

OR

?

For HEV application,the current from the EV battery is modulated / chopped at a very high frequency of maybe 17 to 40 or even 80 kHz.

Your signal frequency?

Current sensors

PM-MCTS-700

Zero flux transducer

Highest accuracy:0.001 %

Highest dynamic range

Bandwidth:250 kHz

PM-CM-700

For any HEV!

GPS

DEWE-VGPS-HS

- Speed

- Distance

- position

- altitude

100 Hz GPS engine

- Speed accuracy 0.1 km/h
- Displacement accuracy <20 cm/km (more than 6 satellites, constant speed)
- Absolute position Resolution< 10 cm
- Low latency <2 ms (using Dewesoft)
- Option: Bright, small, rugged LCD display
- Wide range 6 .. 36 VDC power supply input
- Perfectly suited for DEWETRON systems running DEWESoft software

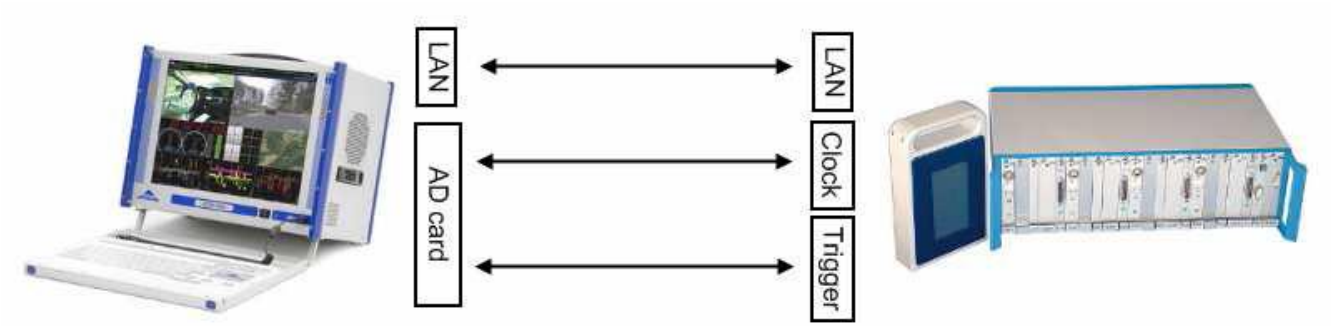
GPS

User conduct

DEWETRON worldwide

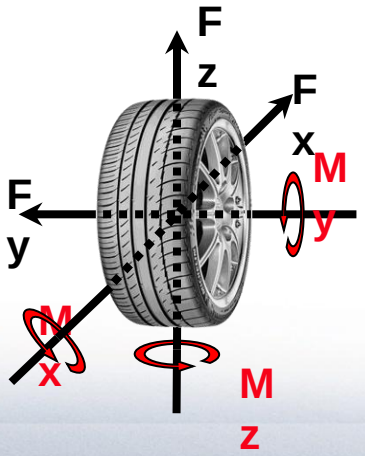
Wheel force transducer

- Measuring one axis or 3D force and torque of the wheel



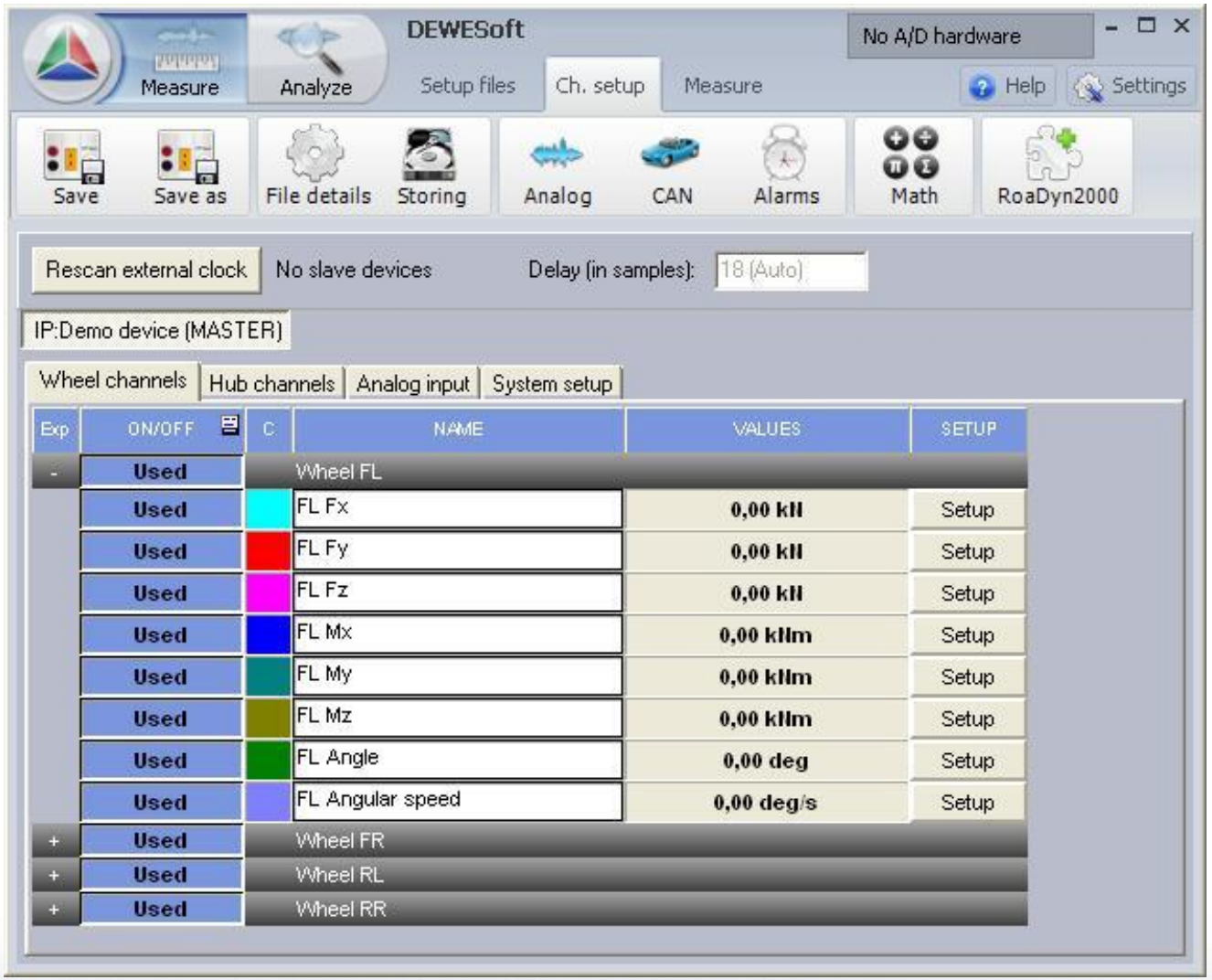
providing all information impacting the car

- DEWETRON provide solution for analog acquisition→ occupy analog channels.
- DEWETRON provide solution for digital interface with HW synchronisation
- CAN interface→Low Speed
- LAN interface→High Speed



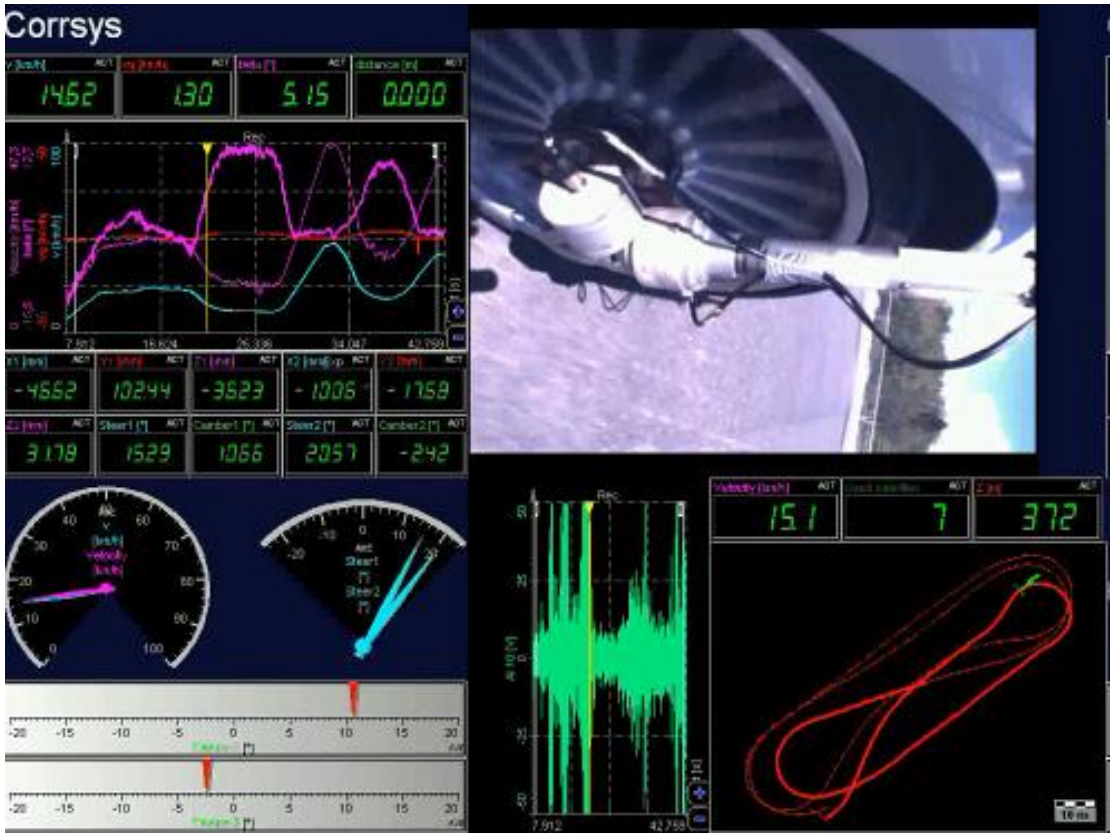
Wheel force transducer

- RoaDyn 2000 LAN support in DEWESoft. already.



Video option

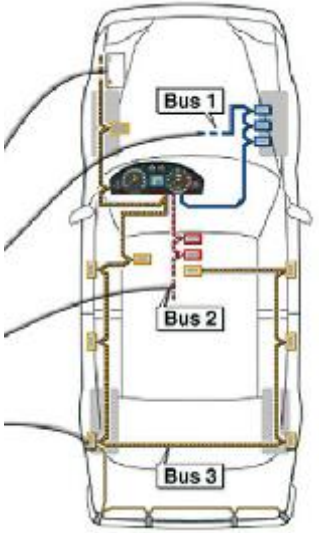
- hardware sychronized
- up to 4 cameras
- Firewire, Ethernet, analog, USB



CAN、OBDII option

- Vehicle CAN bus
- Steering wheel sensor
- GPS/INS gyro platform
- Tyre temperature sensor with telemetry

... any sensor with CAN output

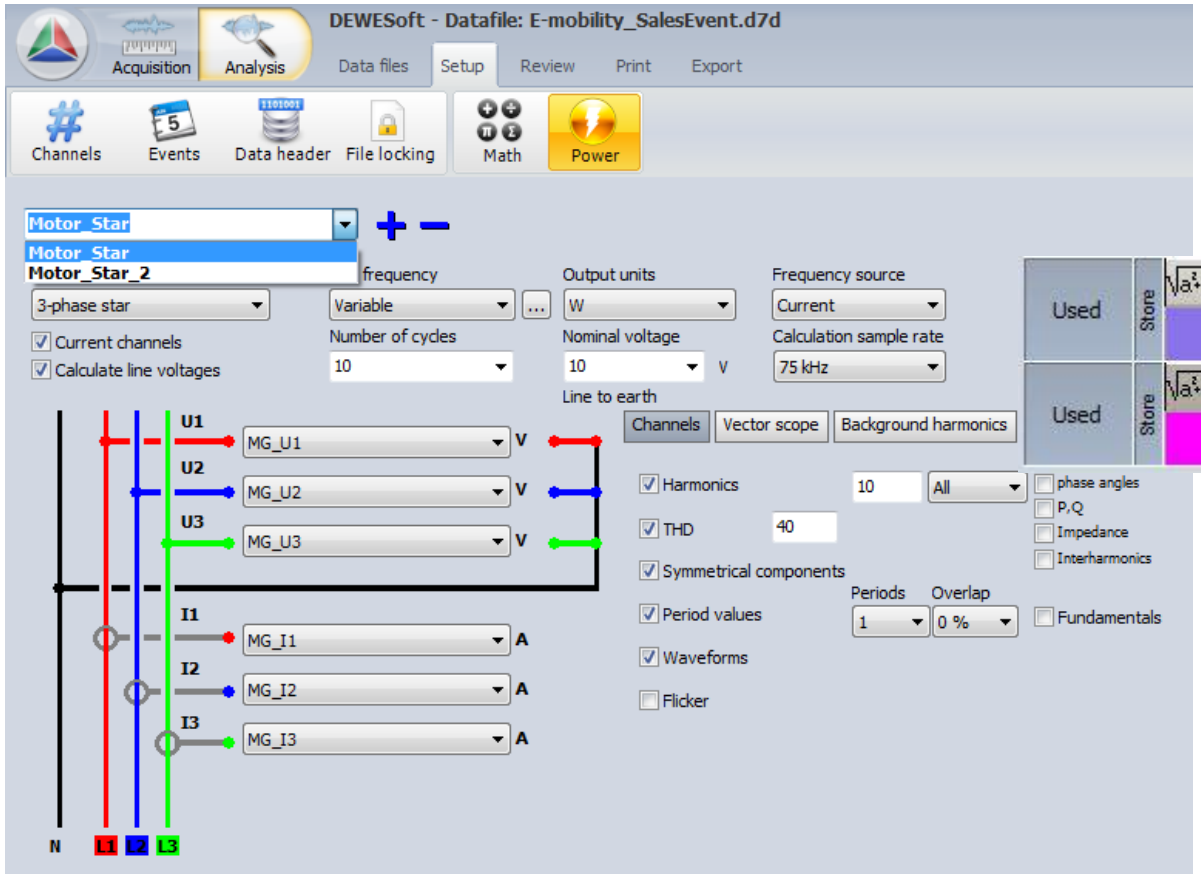


- Easy to use in DEWESoft by support of DBC file

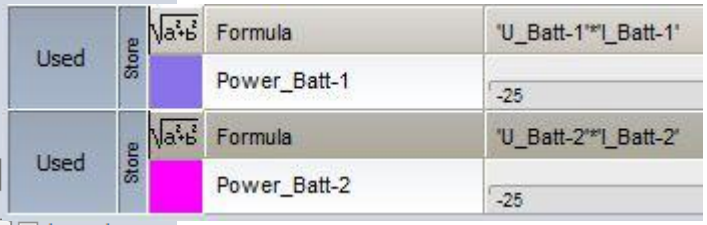
Test Setup

Software setup in Power Module

Multiple AC-Power!



Multiple DC-Power!



Example:

Estimation of the Energy Balance of an Electric Car during Real Driving Conditions

In collaboration with

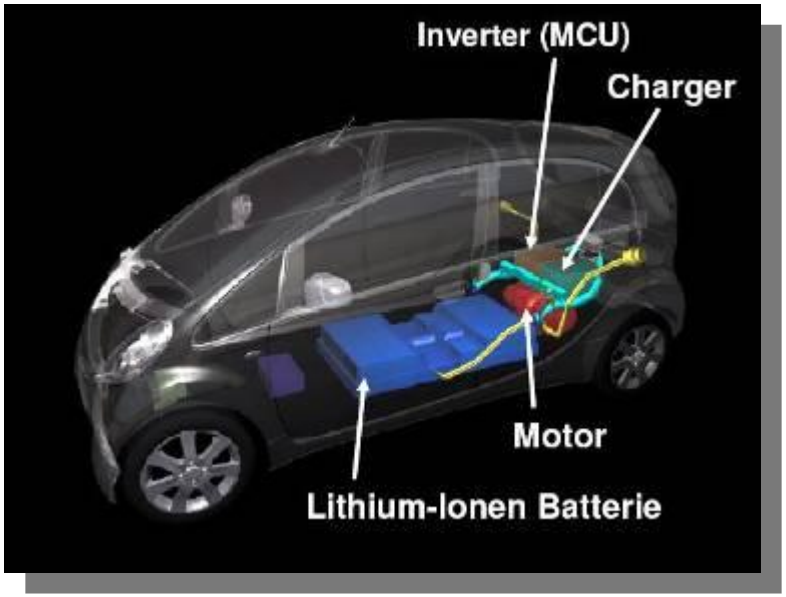
Fachhochschul Studiengänge

Burgenland

and

ENERGIE STEIERMARK

Mitsubishi i-MiEV



Specifications Mitsubishi i-MiEV	
Length / width / height	3475 / 1475 / 1610 mm
empty weight	1110 kg
Seats / doors	4 / 5
top speed	130 km/h
engine Type	3~ Synchronous motor, Permanent magnet
Max power	49 kW (67 PS)
Max torque	180 Nm
Maximum Speed	8000 rpm
Gear selection stages	P-R-N-D-B-C
Drive type	rear-wheel drive
Type of battery	Lithium-Ionen
battery voltage	330 V

Field test Mitsubishi i-MiEV

The combined cycle
Evaluation of the total energy requirement of the test vehicle, as well as assessment of sections consisting of 1/3 highway, 1/3 country roads and 1/3 city driving.

Uphill / downhill ride
Evaluation of the different energy recovery potential through selectable Recuperationsmodes when going downhill.

User behavior
Evaluation of the influence of different users / driving styles on the energy demand based on a test track.

Charging energy
Measurement of the charging energy for charging on the grid. Comparison to that of the battery power provided.

Problem Definition

Energy requirements of electric vehicles?

Data from the manufacturer

Energy requirements are determined on the basis of standardized test cycles on vehicle test benches;
No reference to the daily driving experience;
Real energy demand in general differs greatly from test bench values;

Data from independent studies

Focus of the studies is not usually on the energy consumption of vehicles;

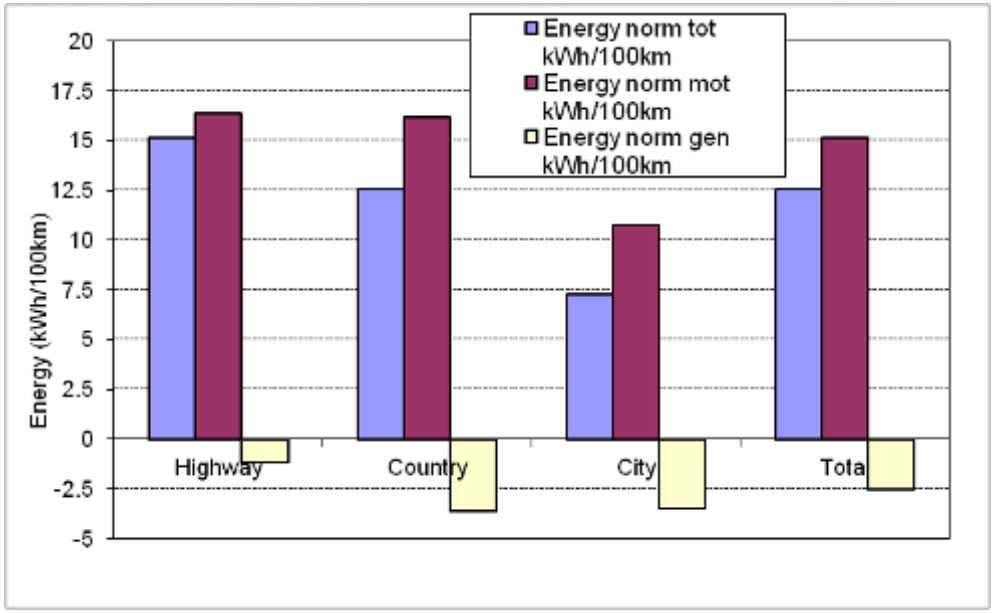
Measurement of energy consumption in real driving conditions places high requirements on the mobile measurement technology

Objective

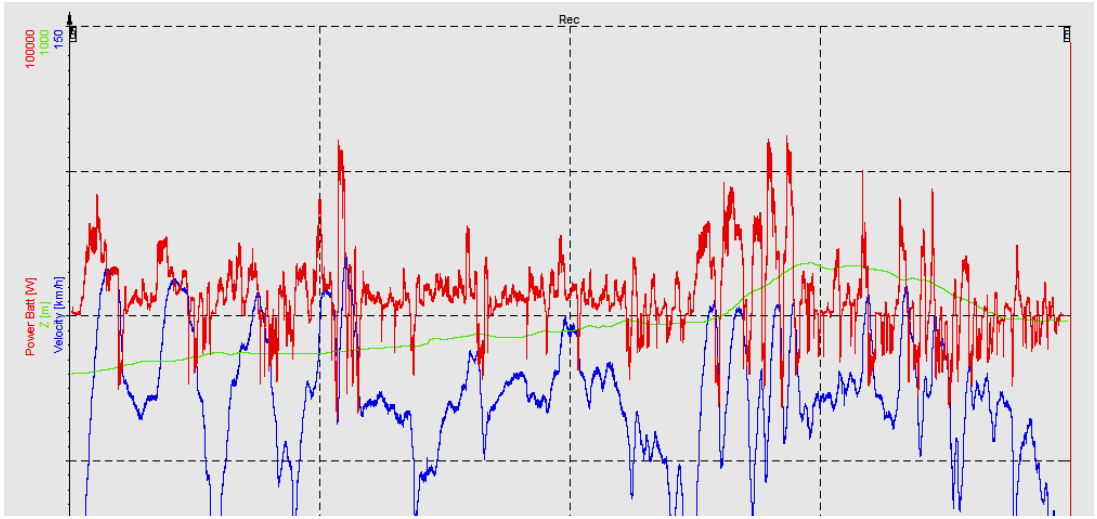
Determining the energy balance of an electric vehicle in real driving conditions

- Determination of the energy demand for typical driving situations
- Investigation of energy recovery by regenerative braking
- Analysis of user behavior
- Determination of the charging energy

The combined cycle

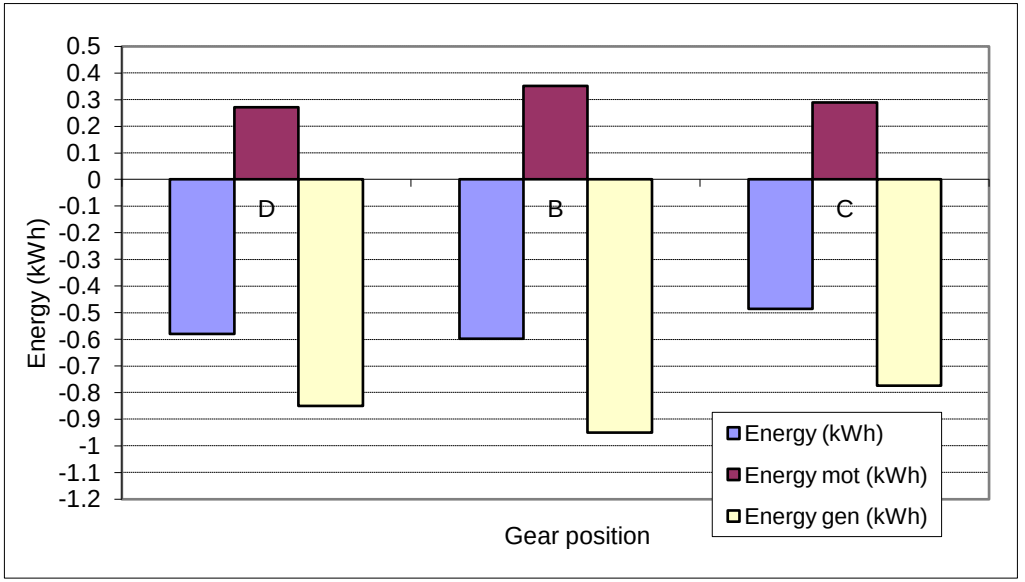


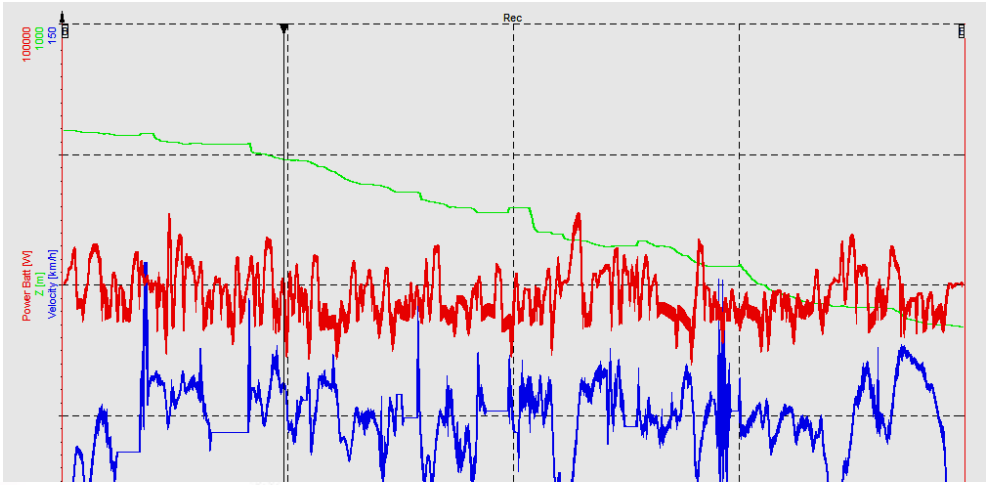
	Highway	Country	City	Total
Battery Energy norm corr (kWh/100km)	21,9	18,1	10,5	18,2
Energy demand corr (l Diesel/100km)	2,20	1,82	1,05	1,83
Energy demand corr (mpg (US-Galllone))	106,8	129,12	223,8	128,4

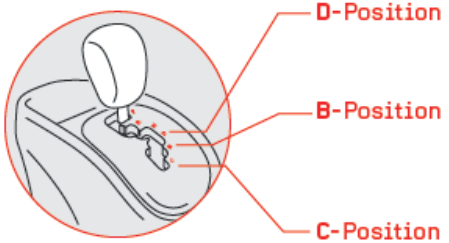


Energy recovery

	D-Position	B-Position	C-Position
Distance (km)	5,75	5,95	5,74
Driving time (min)	11,06	9,60	9,63
Battery Power avg (W)	-3142	-3742	-3027
Battery Energy (kWh)	-0,58	-0,60	-0,49
Battery Power pos avg (W)	1467	2194	1797
Battery Power neg avg (W)	-4609	-5936	-4824

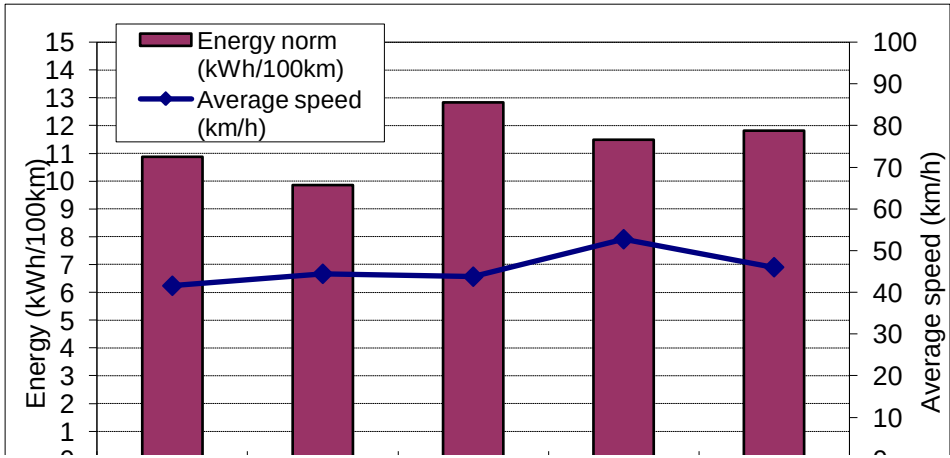




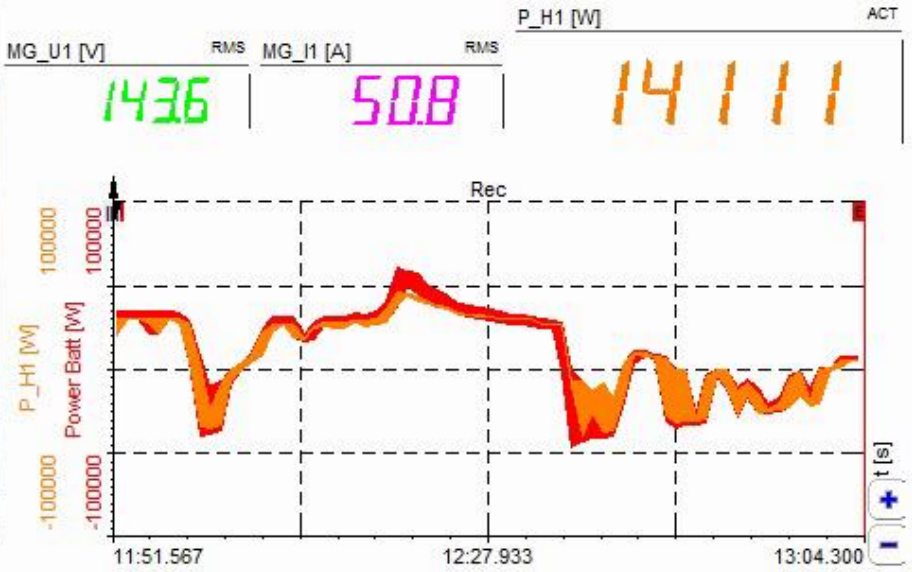


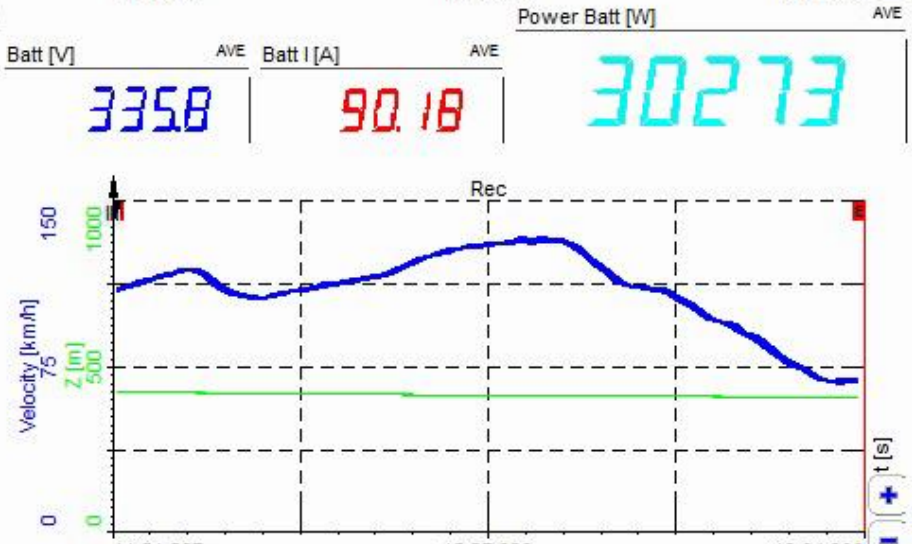
Test track user behaviour

	Driver A	Driver B	Driver C	Driver D	Driver E
Distance (km)	22,2	22,2	21,1	22,2	22,1
Driving time (min)	32,1	30,0	29	25,1	28,5
Battery Power avg (W)	4518	4382	5615	6056	5436
Battery Energy (kWh)	2,4	2,2	2,7	2,6	2,6
Battery Energy norm (kWh/100km)	10,9	9,9	12,8	11,5	11,8
Average Speed (km/h)	41,6	44,4	43,8	52,8	46



Datafile example

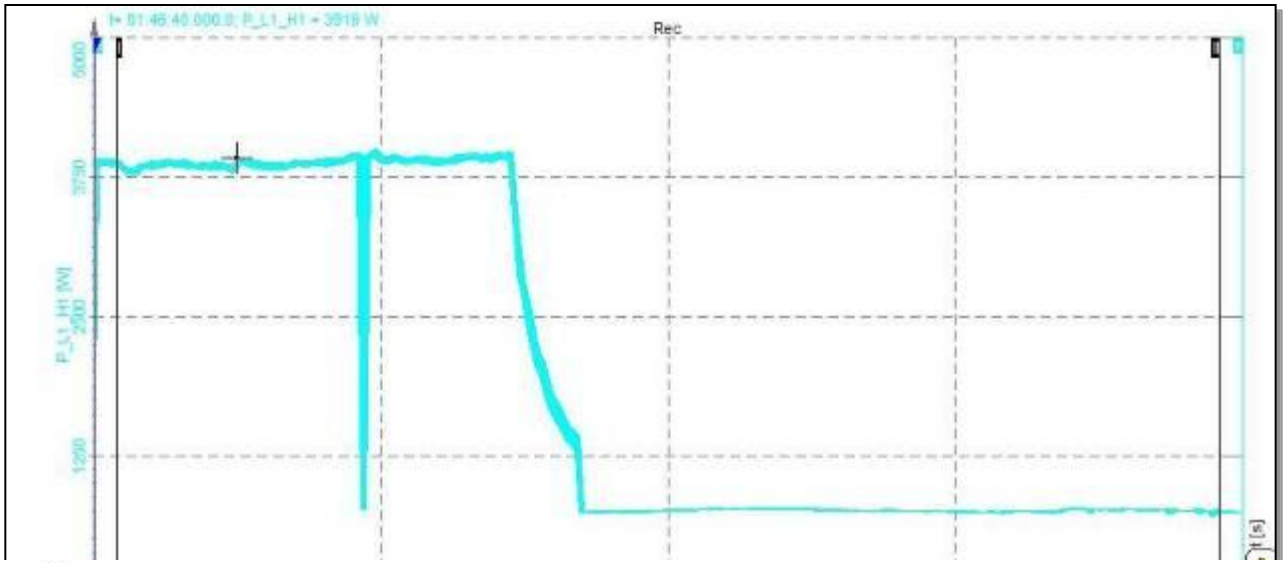




Charging energy

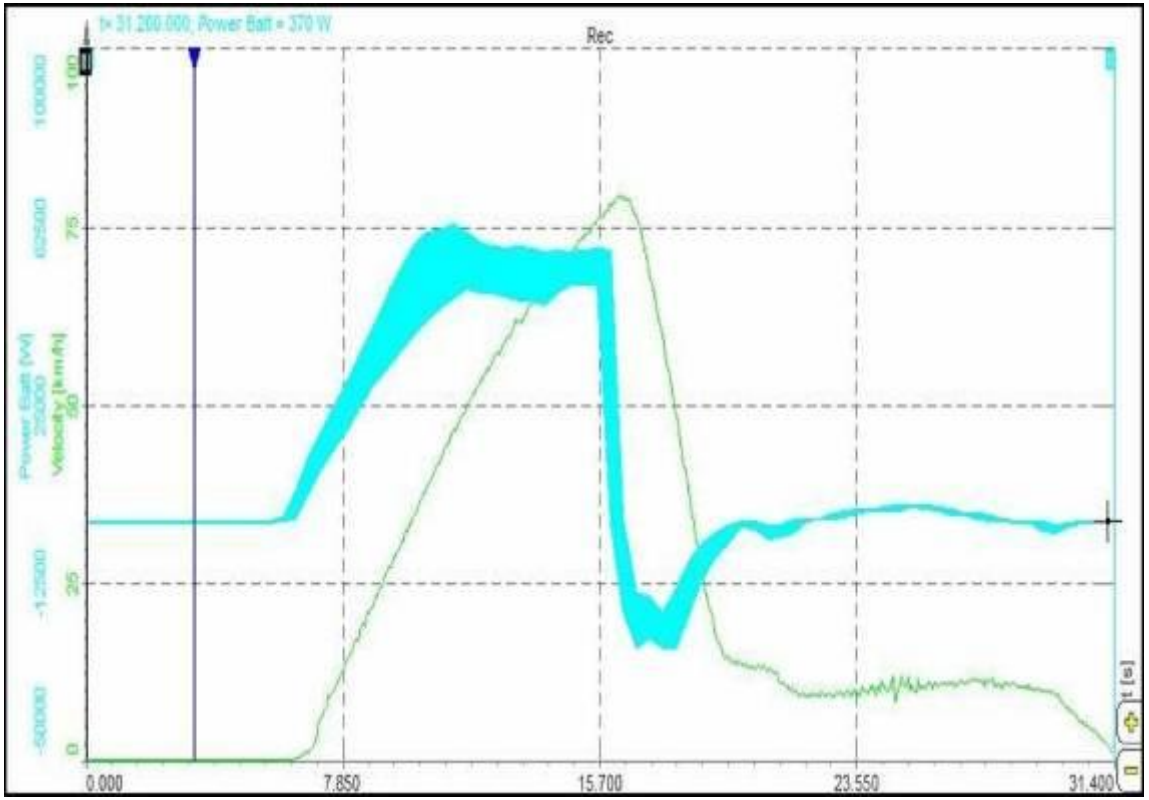
	Charge
Charging time (hh.min)	6,15
Rated charging power (W)	3840
Charging energy (kWh)	22,1
Charging power conservation (W)	2

	Discharge
Discharging time (h)	3,52
Discharge avg (W)	3994,8
Discharge energy (kWh)	15,3
Charge efficiency (%)	69,3



Acceleration

Acceleration	0 – 80 km/h
Distance (m)	448,6
Driving time (sec.)	10,45
Battery Power avg (W)	40317
Battery Energy (kWh)	0,118
Battery Energy norm (kWh/100km)	26,3
Battery Power max (W)	56418
Motor Power max (W)	46155
Speed max (km/h)	79,3



Summary

- Energy consumption in the combined by a factor of 2-3 lower than comparable vehicles with internal combustion engine
- Energy recovery by about 17% in the combined (total) at a high level
- "Economical" driving also shows an effect on electric vehicles

Application Pictures









Demands on the DAQ system

- Isolated inputs
- High bandwidth
- Fast sampling rate
- Simultaneous sampling
- Direct voltage / sensor input
- CAN bus, Flexray

- Multiple power calculation modules (3 phase, DC)
- High CPU performance
- Portability
- Battery operation
- Fail safe operation

Yes we can!


DEWESoft - Datafile: E-mobility_SalesEvent.d7d
Video
AC-Power
DC-Power
Mech-Power
GPS-Data
CAN-Data
Scope

Our customers

Benefits

- Multiple power modules (AC and DC, High Speed Isolation)
- Broadband Clamps
- Different frequencies
- Dewesoft Power Analysis Module:calculates more than 100 parameters
- GPS
- Video、CAN、OBDII
- digital interface with Kistler Wheel force transducer
- Online and offline and for sure synchronous!